

REMARKS

Claims 1-10 are pending in the instant application. Claim 10 is withdrawn from consideration as directed to non-elected subject matter that was subject to a Restriction Requirement. No claims are currently amended, added, or cancelled.

The Examiner has requested that the Applicants affirm the election of Group I, claims 1-9, for prosecution in response to the instant Office Action. As set forth in further detail below, the Applicants affirm the election of Group I, claims 1-9, for prosecution **but with traverse**.

Claims 1-9 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 1-9 also stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyajima et al. (U.S. Pre-Grant Pub. No. 2002/0015748) in view of Lee et al. (European Patent Pub. No. 0997498). As set forth in further detail below, the Applicants respectfully traverse the rejection of claims 1-9 under 35 U.S.C. §112 on the basis that claims 1-9 are clear and definite to those of skill in the art. The Applicants also respectfully traverse the rejection of claims 1-9 under 35 U.S.C. §103(a) over Miyajima et al. in view of Lee et al. on the basis that one of skill in the art would **not reasonably have been expected** to practice the invention claimed in independent claim 1 based upon the combined teachings of Miyajima et al. and Lee et al.

As to the Election of Group I, Claims 1-9 With Traverse

As a basis for maintaining the instant Restriction Requirement between Group I, claims 1-9, and Group II, claim 10, the Examiner has argued that there is no special

technical feature linking the inventions of Groups I and II such that restriction is appropriate. In particular, the Examiner has argued that Miyajima et al. teaches a method of manufacturing a semiconductor device sealed in a cured resin body by placing an unsealed semiconductor device into a mold and subjecting the curable resin composition that fills the spaces between the mold and the unsealed semiconductor device to compression molding under a predetermined molding temperature. The Examiner has also argued that Lee et al. teaches a compression set of elastomeric silicone compositions used in cured injection moldable compositions, and that Lee et al. teaches that the silicone compositions have a viscosity of less than 90 Pa.s.

While recognizing the Lee et al. fail to teach the claimed torques and times of claim 1, the Examiner has determined that one of skill in the art would have found it obvious at the time of the invention to have used the claimed torques and times to satisfy the need of having a molding material which maintains low viscosity for the time required to fill all the voids and then be rapidly cured. As such, the Examiner has determined that there is no special technical feature linking the inventions of Groups I and II.

The Examiner's rejection of claims 1-9 under 35 U.S.C. §103(a) over Miyajima et al. in view of Lee et al. is addressed in further detail below. In particular, the Applicants respectfully submit that there is no basis for the Examiner's position that the torques and times claimed in claim 1 would be obvious to a person of ordinary skill in the art and that the torques and times recited in claim 1 provide the special technical feature that links the inventions of Groups I and II. As made clear through the traversal of the obviousness

rejections below, the torques and times directly relate to processing conditions (which are relevant to the method of claim 1 in Group I), and the torques and times also directly relate to minimized warping in the semiconductor device. As made clear with reference to the Practical Examples in Table 2, the claimed torques and times result in production of a distinct semiconductor device that exhibits minimized warping and excellent appearance and fillability such that the semiconductor device of claim 10 contains a special technical feature due to the claimed torques and times. Because claims 1 and 10 contain the same special technical feature, i.e., the claimed torques and times or physical properties resulting therefrom, the Applicants respectfully submit that the Examiner's Restriction Requirement is improper and must be withdrawn.

As to the Rejection of Claims 1-9 Under 35 U.S.C. §112

The Applicants respectfully traverse this rejection on the basis that claims 1-9 are clear and definite in their current form. In particular, the Examiner has objected to the phrases “subjecting a curable liquid silicone composition” and “the unsealed semiconductor device to compression molding” in independent claim 1 as being unclear. However, the Applicants respectfully disagree with the Examiner. The Applicants respectfully submit that, when considered in context, the phrases that are objected to are clear. The complete phrase at issue is “subjecting a curable liquid silicone composition that fills the spaces between the mold and the unsealed semiconductor device to compression molding”. When considered in context, it is clear that the phrases “that fills the spaces between the mold and the unsealed semiconductor device” and “to compression molding” are separate and both pertain to the

curable liquid silicone composition. Stated differently, the Applicants respectfully submit that the claim language clearly conveys that the curable liquid silicone composition is claimed to fill the spaces between the mold and the unsealed semiconductor device, and the claim language further conveys that the curable liquid silicone composition is subjected to compression molding.

In view of the foregoing, the Applicants respectfully submit that the rejection of claims 1-9 under 35 U.S.C. §112, second paragraph, is improper and must be withdrawn.

As to the Rejection of Claims 1-9 Under 35 U.S.C. §103(a) Over Miyajima et al. in View of Lee et al.

As alluded to above, the Applicants respectfully traverse the rejection of claims 1-9 under 35 U.S.C. §103(a) over Miyajima et al. in view of Lee et al. In particular, the Applicants respectfully submit that there is no basis for the Examiner's position that the torques and times claimed in claim 1 would be obvious to a person of ordinary skill in the art.

To summarize the relevant standards that the Examiner must apply in performing an obviousness analysis of the present claims, 35 U.S.C. §103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1734, 82 USPQ2d 1385, 1391 (2007). As the Examiner is aware, the question of obviousness is resolved on the basis of underlying factual determinations

including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). See also *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. at 1734, 82 USPQ2d at 1391 (2007). As succinctly summarized in MPEP 2141(II.), the focus when making a determination of obviousness should be on what a person of ordinary skill in the pertinent art **would have known at the time of the invention, and on what such a person would have reasonably expected to have been able to do in view of that knowledge** (emphasis added). In this context, the Applicants further note that there must be a reasonable expectation of success to properly establish obviousness in view of modified or combined teachings in the references(s) relied upon (see MPEP 2143.02).

Further, it remains a fundamental tenet of the obviousness analysis that reference(s) relied upon to establish an obviousness rejection must teach or suggest each and every feature of a claim. In particular, MPEP § 2143.03 requires the "consideration" of all words in a claim in an obviousness determination. However, to render a claim unpatentable, the Examiner must do more than merely "consider" each and every feature of the claim. In particular, the asserted reference(s) must also teach or suggest each and every claim feature. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (to establish prima facie obviousness of a claimed invention, all the claim features must be taught or suggested by the prior art). Indeed, a proper obviousness determination requires that an Examiner make "a searching comparison of the claimed invention - including all its limitations - with the teaching of the prior art." (Emphasis added) See *Ex parte Wada and Murphy*, Appeal 2007-3733, (citing *In re Ochiai*, 71 F.3d 1565,

1572 (Fed. Cir. 1995)). This is supplemented by MPEP § 904, which states that the Examiner's search "should cover the invention as described and claimed." These principles remain unchanged by the decision in *KSR Int'l Co. v. Teleflex Inc.* Thus, it remains fundamental that to establish a *prima facie* case of obviousness of a claim, **prior art references, after combination, must still teach or suggest all of the claim elements.**

By way of background, the instant invention was developed to address difficulties with minimizing warping of semiconductor chips while preventing formation of voids in sealing material used to encapsulate the semiconductor chips. As set forth in paragraph [00006] of the instant application as filed, due to thinning of semiconductor chips that occurs with miniaturization of semiconductor elements, current compression molding techniques that are described in paragraph [00005] for encapsulating the semiconductor chips increase warping of the semiconductor chips. Warping of the semiconductor chips results in worsening of performance characteristics of the semiconductor chips, and it is clearly advantageous to minimize warping of the semiconductor chips.

As a primary issue, the Applicants note that Lee et al. does **not** teach use of the silicone compositions taught therein for compression molding techniques to encapsulate semiconductor devices. While paragraph [0076] of Lee et al. mentions compression molding the curable silicone composition, **it is notable that the compression molding technique does not involve encapsulation of a semiconductor device.** As such, Lee et al. clearly fails to address the problems that are addressed above relative to minimizing warping and preventing formation of voids. Lee et al. fails to recognize the problems with

encapsulating semiconductor chips using compression molding techniques, and there is nothing to suggest to a person of skill in the art that the compositions or techniques described by Lee et al. could be employed to address both prevention of void formation **and** minimization of warping of the semiconductor chips. Further, Lee et al. teaches a broad range of curing temperatures for the silicone compositions disclosed therein (70-200°C, see paragraph [0070] of Lee et al.), and there is no disclosure within Lee et al. to suggest to one of skill in the art that sub-ranges of curing temperatures disclosed therein could be used to achieve the torques and times claimed in independent claim 1 to both prevent void formation **and** minimize warping of semiconductor devices that are encapsulated with the silicone compositions. As such, the Applicants respectfully submit that one of ordinary skill in the art would **not** reasonably have been expected to select the silicone compositions of Lee et al. **and then employ those compositions** within the context of Miyajima et al. to encapsulate semiconductor devices through compression molding according to the instantly claimed processing parameters to arrive at the invention as claimed, with an expectation of success in terms of preventing void formation **and** minimizing warping.

It is notable that the Examiner's rationale for obviousness of the claimed torques and times in view of the disclosure of Lee et al. is that it would have been obvious to have a molding material which maintains low viscosity for the time required to fill all the voids and then be rapidly cured. The Examiner's rationale for obviousness **would clearly favor maximized processing temperatures to lower viscosity to promote flow of the silicone composition to fill all the voids and to further promote rapid curing.** However, as is

apparent with reference to the Examples contained in the instant application, higher processing temperatures result in a **decrease** in time to reach torque of 1 kgf·cm **and a decrease** in time for torque to grow from 1 kgf·cm to 5 kgf·cm (see data for Curable liquid silicon rubber compositions (A)-(D) in Table 1 on page 15 of the original application as filed). Merely maximizing processing temperature to promote flow of the silicone composition to fill voids and achieve rapid curing **fails to account for every aspect** of the instantly claimed invention and does not address the fact that time to reach 1 kgf·cm is **not less than 1 minute** (whereas maximizing processing temperature to reduce viscosity could result in times to reach 1 kgf·cm of less than 1 minute as illustrated in Table 1 relative to silicone compositions (C) and (D)) and that minimization of warping is achieved by a time during which torque grows from 1 kgf·cm to 5 kgf·cm. In fact, there is **no recognition** in either Miyajima et al. or Lee et al. of any solution for alleviating warping of the semiconductor devices.

As set forth in the specification, times to reach torque of 1 kgf·cm for the silicone composition that are **less than** 1 minute impair fillability (as does viscosity of the silicone composition at room temperature of greater than 90 Pa·s) and may lead to formation of voids (see paragraph [0040] in the original application as filed). As such, the instant invention places a threshold on how fast the silicone composition initially cures. On the other hand, fast times to reach torque of from 1 kgf·cm to 5 kgf·cm of less than 1 minute are necessary to prevent the semiconductor chip from being subject to more significant warping and worsening moldability (see paragraph [0040] in the original application as filed). There is

clearly a balance between **slowing** the time to reach a torque of 1 kgf-cm and **hastening** the time for torque to grow from 1 kgf-cm to 5 kgf-cm in the context of the invention claimed in independent claim 1 of the instant claims, and such balance is not recognized, nor rendered obvious, by either Miyajima et al. or Lee et al.

As also made clear through the data in Table 1, the very same silicone composition can have a time to reach torque of 1 kgf-cm that is **not less than** 1 minute and a time to grow torque from 1 kgf-cm to 5 kgf-cm of **not more than** 1 minute under certain processing conditions (e.g., compression molding at 120°C relative to compositions (A) and (B) in Table 1), and can have a time to grow torque from 1 kgf-cm to 5 kgf-cm of **more than** 1 minute under *other* processing conditions (e.g., compression molding at 70°C relative to compositions (A) and (B) in Table 1). Therefore, it is clear that time to reach torque of 1 kgf-cm and time to grow torque from 1 kgf-cm to 5 kgf-cm are **features that are dependent upon the specific processing conditions** such that any random hydrosilylation-curable silicone composition having viscosity of 90 Pa-s or less does not necessarily possess the claimed time to reach torque of 1 kgf-cm and a time to grow torque from 1 kgf-cm to 5 kgf-cm. As such, the Examiner cannot satisfy the burden to establish obviousness unless an explanation can be provided for how one of skill in the art would reasonably have been expected to modify the processing conditions of Miyajima et al. or Lee et al. to account for the claimed times and torques, which have the above-stated benefits with regard to preventing void formation and minimizing warping of the semiconductor devices.

Simply stated, there is no recognition in Lee et al. (or in the prior art in general) to balance the time to reach a torque of 1 kgf·cm and the time for torque to grow from 1 kgf·cm to 5 kgf·cm. As such, the Applicants respectfully submit that the claimed features of the silicone composition of viscosity of 90 Pa·s or less, time to reach torque of 1 kgf·cm of not less than 1 minute, and time to reach torque of from 1 kgf·cm to 5 kgf·cm of not more than 1 minute represent a combination of non-obvious special technical features that result in acceptable fillability and appearance while minimizing warping of the semiconductor devices.

In view of the foregoing, the Applicants respectfully submit that the claimed viscosity, torques, and times recited in independent claim 1 are not obvious over Miyajima et al. in view of Lee et al. such that the rejection of claims 1-9 under 35 U.S.C. §103(a) over Miyajima et al. in view of Lee et al. are overcome and must be withdrawn. The Applicants further submit that the above-mentioned combination of viscosity, torques, and times provide the special technical feature that links the inventions of claims 1 and 10 such that the Restriction Requirement must be withdrawn and claim 10 rejoined into the instant application.

The Applicants respectfully submit that independent claims 1-10 are in condition for allowance, which allowance is respectfully requested. This Response is being filed timely and it is believed that no fees are presently due. However, the Commissioner is hereby authorized to charge any additional fees or credit any overpayments to the undersigned's deposit account 08-2789.

Respectfully submitted,

HOWARD & HOWARD ATTORNEYS, P.C.

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/Christopher S. Andrzejak/

Christopher S. Andrzejak, Registration No. 57,212

450 West Fourth Street

Royal Oak, MI 48067-2557

(248) 723-0438